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SCIENCE AND CREATION:

THE CHRISTIAN INTERPRETATION

BY

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"Jesus answered them, My Father worketh even until now, and I work."

JOHN V. 17 (R.V.)

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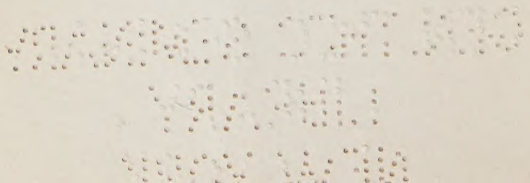

PREFACE

All that I have to say in these lectures may be summed up in a great saying of our Lord recorded by St. John : "My Father worketh even until now and I work." It was His reply to the Jews who raised objection to one of His works of mercy, because it was done on the Sabbath Day. There are other places in the Gospels where our Lord justifies, but in a different way, His frequent disregard of the accepted regulations about the Sabbath. Here He boldly challenges that Jewish interpretation of the Scriptural account of Creation which was made the basis of these regulations. It is a splendid instance of His method of fulfilling the law and the prophets by drawing out a deeper principle.

God rested, it was said, upon the seventh day, having finished the work of creation. Therefore, argued the Jewish interpreter, the holiness of that day must

be preserved by an absolute cessation of work of every kind. Our Lord did not criticize the ancient scripture: He brought to light a new principle, deeper than the old. He taught that the work of God in creation never ceases, and that His own work is of like nature. He substituted, in fact, for the old conception of creation as an operation once for all completed, the idea of a continuous process. The work of God, He teaches, goes on throughout the ages.

Here is exactly the change in point of view which has taken place, through scientific discovery, in our own time. The great words, "My Father worketh even until now and I work," have acquired, through the advance of human thought, a significance and a value which were hidden from past generations.

I

THE EPIC OF CREATION

From a whole group of sciences which have been extending their boundaries until they have almost united into one vast empire of thought there has emerged a great view of the process of the Universe. It is a splendid Epic of Creation, grander, more far-reaching, more stimulating to the imagination, than any which poetic visions of the past concerning the origins of things gave to the minds of former generations. Astronomy, physics, geology, biology, anthropology and human history as now studied, present an almost continuous pageant of the phases of the creative process which has made our world what it is. The idea of evolution fascinated the nineteenth century, and Darwin's conception of the Origin of Species appeared to be the firmest support of the general idea. In our time, a curious

change has taken place, for, while Darwin's name is still the most signal mark of a revolution in thought, his special theory no longer secures the assent of scientific minds. It has been so modified that it has become transformed. But the great principle which he affirmed—the principle of continuous change from form to form of life, secured by natural selection, and proceeding from the simplest beginnings to man with his highly organized intellectual and social life—remains, and every additional line of research seems to contribute to its confirmation.

It is also very important to note that this scientific restatement of universal history is now passing beyond the lecture-room and the learned journal, and becoming the possession of the multitude. Book after book of the most popular sort, presenting the new view of the world, is being published, and the literature thus coming into existence is being read by tens of thousands of the more thoughtful of all classes. Even sensational novels are finding themes in the ideas thus set free.

This being so, it is a very serious matter that, to the average mind, Christianity in all its varieties seems to cling to an outworn view of the origins of things. It is true that among the educated the Christian creed is no longer thought to require the old interpretations of the Book of Genesis. But this is not enough. The situation demands something more than an apologetic. If the scientific view of the history of the world be even approximately true, it should be, not a difficulty to be explained away in the terms of an ancient theology, but a source of light giving a new illumination and a fresh meaning to our Faith.

My purpose in these Lectures is to show that we should approach the great scientific story of Creation, not with hesitation or suspicion, but with frank appreciation; and, that, if we do so, we shall find truth which will help, and not hinder us, in our Christian convictions.

My theme is indeed the old one that, if we examine nature, we shall find proof of the being of the Creator and some evidence as to His character. I set aside

the metaphysical objections which have been raised by Hume, Kant, and others, to the possibility of such an argument. To deal with them would take all my space and leave us much where we were. These objections and Herbert Spencer's, as stated in the earlier part of his *First Principles*, seem to me to derive all their force from the fact that the old apologists set out to prove the validity of a definite conception of the nature of God. They always had in mind the idea of Him as transcendent, in the sense that they regarded Him as related to creation in much the same way as man is related to the works of his hands; and to this conception there is always the objection that the universe regarded as a whole is a very different sort of effect from any which man can produce by using the materials he finds in the world about him. This was the essence of Hume's objection, and it is exactly parallel to Herbert Spencer's criticism of the theory which, as he says, assumes that "the genesis of the Heavens and the Earth is effected somewhat after the manner in which a

workman shapes a piece of furniture." It is quite true, I think, that Paley, in his *Natural Theology*, and many others, in the eighteenth century, and in pre-Darwinian days, laid themselves open to this criticism. But when Herbert Spencer, in summing up his argument, declares that "the Power which the Universe manifests to us is utterly inscrutable," he falls himself into the very sort of contradiction of which he accuses others, because it is surely clear that if the Universe to any degree "manifests" a Power, that Power, so far as it is manifested, is not utterly inscrutable.

It may seem strange to go back to Herbert Spencer I do so, because I know no writer who sets in a clearer light the problem with which we are now confronted. He feels bound to admit the existence of a "Power" which is "manifested" in the Universe. Here he is surely right, because we are bound to think of the Universe as a whole, and because more and more the inter-relatedness of its parts, that is, its wholeness, is being revealed. But he is surely

wrong in saying that, while manifested, it is also utterly inscrutable. My purpose, in these Lectures, is to enquire, How far is it manifested? And, in trying to answer this question, I ask you to put out of your mind such ideas as those of omnipotence, perfection, infinity, immutability, etc. Even if it be true that these ideas must enter theology, they must not be imported at the beginning of our enquiry. It is very difficult to approach such an enquiry with unprejudiced minds, but, if our induction is to be a genuine one, we must endeavour to keep clear of these great abstract conceptions which introduce problems of special difficulty and are almost impossible to define.

Having thus cleared the ground, let me set before you, with as much brevity as possible, that view of the history of the Universe which we must now examine. First, astronomy, by its investigations of the nature, magnitude and movements of the stars, presents us with the setting of the stage within which that history has taken place. Those who have looked

into Prof. Eddington's work on *Stellar Movements and the Structure of the Universe* will have some idea of the almost incredible grandeur of the physical world. In these immense spaces distance is now measured by astronomers, not by miles, or even millions of miles, but by light-years and parsecs, as they are termed. Here countless millions of suns stream in related groups through millions upon millions of years on courses which are defined by their inter-relations. Yet this stellar universe is not infinite in the old sense of that word. According to the theory of Relativity which is now being more and more received, space is finite, though unbounded. If this be true, it is a fresh proof of the Unity of Creation—no unimportant matter.

When from these overwhelming reflections we turn to recent investigations into the structure of the material world, we find another amazing unification. We are now told by physicists that the units, which together make up the atoms or molecules which form the physical elements, are all definable as charges of

energy—usually expressed in terms of electricity. On the basis of this principle, the so-called chemical elements are capable of classification and their relations to one another can be accurately stated. They have, in fact, lost that ultimate character which seemed formerly to belong to them. The present indications seem to show that they can break up and be transformed one into another.

Near the centre of that vast system of suns which lies within the circuit of the "milky way" is our Solar System. Some men of science have formed the opinion that this central position is significant—that our sun and its planets occupy a position of greater physical stability than is possessed by most other suns and their planets. Whether this is so, or not, I do not know. It is, I imagine, a question that science is not able at present to pronounce upon. Still the fact is worth noting, when we consider that on one at all events of the members of the solar system there has developed the wonderful life-series and the history of

man. In the great Universe there may be other developments equally marvellous, could we know of them. We speak only of what we know.

Geology has taught us to look back through an incredibly long vista of ages, during which our earth was slowly brought to such a condition, in the conformation of its continents and seas, in its relative temperatures and degrees of moisture and drought, in its atmosphere and moderation of solar light and energy, that it was fitted to become the habitation of living things. And, when all was ready, Life appeared. Whence springing we do not know, and for our present purpose we need not ask—though, so far, no research has bridged the gulf between the inorganic and the organic.

At an early stage the series of living things divided into two: the vegetable series, which is able to take up material from the inorganic environment and transform it into organic substance; and the animal series, which is able to take the organic material thus prepared and use it for its own proper subsistence.

Thus were living creatures launched upon their great career.

The world of living things is also remarkable for the multitude and variety of its forms. Creative power, or however we name it, in its use of this new medium, reveals a profusion of imaginative resources (as it may well seem to us) which baffles all description. No one can take up the study of even one family of living things, whether vegetable or animal, without finding himself lost in the pursuit of its innumerable varieties.

Out of this riot of life emerges man, linked by many marks of kinship with the other species in the natural order to which he belongs, but distinguished by his great brain, his nicely balanced upright figure, his skilful hands, and his expressive face. Above all, showing that unique eminence of intelligence which corresponds to these distinctions.

There is nothing more remarkable in recent science than the sure position which the study of anthropology is gaining. It is linking the natural sciences with history. I commend to your read-

ing, in this connection, such a work as Prof. H. F. Osborn's *Men of the Old Stone Age* in conjunction with the recently published First and Second Volumes of the *Cambridge Ancient History*, and Prof. Myres' delightful little book *The Dawn of History*. The work of the spade, especially in many regions of the Near East, is enabling history to push her researches back far beyond the confines which formerly hemmed her in. She is now able to write, in large part, the histories of Babylonia and Egypt from considerably before 3000 B.C., and to describe the characters and doings of their greater personages. She is also able, in Elam, Babylonia and Egypt, to link up the civilizations of these peoples with the neolithic cultures which preceded them. The spade has also brought to light a great Mediterranean civilization of equal antiquity, centred in Crete, and seemingly far more "modern" in many of its characteristics than the civilizations of the East. This Cretan culture is now known to be the parent of Mycenae, and the grandparent of the wonderful

Greek civilization of later historic times. Unhappily the language of prehistoric Crete has not yet been deciphered.

When we read these new books, we find ourselves thinking of history, not in centuries, but in millenniums. We discover that Rome is not the Eternal City. She is but of yesterday when compared with Memphis or Babylon, or, still more, with Susa. The step-pyramid of Sakkara at Memphis was probably nearly 2,000 years old when the coffin of Tutankhamen was laid in his tomb.

These things stir our imagination; they also enable us to link our own age with the events of 5,000 years ago. But the spade has given us a dim insight into a period far more remote. Fifteen or twenty thousand years ago, as we are told, there lived in Western Europe a race of men belonging to the palaeolithic culture, men, that is, whose implements consisted mainly of delicately chipped flints, who hunted the horse, the bison and the mammoth. They knew nothing of agriculture or of the arts of the herdsman or the shepherd. But they had large

brains, finely built bodies, heads and faces well shaped, though with some peculiarities, and in some tribes, at all events, tall stature. They were indeed men of a very fine type. And they proved their capacities by their wonderful delineations of the animals which they hunted. Their ivory carvings, their outline drawings, their mouldings in clay, and their paintings in colour are, within their limits, as true and as fine in art as any work ever done by the hand of man.

We may well ask, How could such art flourish among a people who must have been, it would seem, in other respects, savages at a very low stage indeed. As we go on we shall see, I think, that the wonderful art of palaeolithic man is a symbol of much else in human development.

At a later period there emerged another human type, with new methods, new implements, a new culture. These men are classed as Neolithic. Their weapons and tools are still of stone, but the stone is polished, and their way of life is different from that of the earlier type.

For, while the men of the older race were hunters, these later men were tillers of the soil. We seldom think of how much we owe to these early cultivators. They did a very wonderful thing. They took the wild grasses which suited their purpose and grew them for food, selecting them with so much skill that they produced the cereals which are to this day the main support of human life. To these neolithic men we owe not only wheat, barley, oats—the very staff of life—but all our principal vegetables and fruits. And they were breeders of stock as well as agriculturists. They tamed the ox, the sheep, the goat and other creatures. They were, in fact, in all senses of the word, the first farmers. It seems also to be clear that, in neolithic times, over great areas of the western world, there was a very long period of peaceful development. The old tradition of a remote Golden Age, in which men dwelt in happy security and cultivated the arts of peace, may have some foundation in fact. It would seem indeed that for such great works as the development of the cereals from wild grasses and the

successful production of a great number of cultivated vegetables and fruits there was necessary in a primitive age a very long time of undisturbed agriculture. Recent investigation of the extent of prehistoric cultivation terraces in the Mediterranean basin seems to prove that, in neolithic times, that area was thickly inhabited in all the favourable parts by a settled population. Professor J. A. Thomson* actually states that calculation of the capital value of these ancient Mediterranean terraces "brings out the marvellous, yet credible, result that the actual economic wealth of this remote prehistoric world far exceeded that of the Mediterranean to-day."

In neolithic times there was no art (so far as existing remains prove) to approach that of the greater races of palaeolithic man, until towards the dawn of history, when, especially in Elam and in Egypt, there appear some very perfect types of pottery. But there must have been a very high degree of intelligence. For to cultivate a certain wild Syrian

* *Evolution*, p. 180.

grass until it produced wheat was one of the greatest triumphs of science in human experience. And this is only one example out of many. Those old cultivators, indeed, far surpassed, in the greatness of their discoveries, all the efforts of modern scientific agriculture. It may be because they were the first, and the greatest discoveries were inevitably the earlier; but I cannot see that, when this has been said, it takes away much of their greatness; because they were the creators of a vast human heritage into which man in later times entered, enjoying the results of their experiments and using the fruit of their observation and experience.

Here again I would have you note how, in a very remote period, and among a people otherwise very primitive, there appeared a mental power of extraordinary effectiveness, an originating genius which achieved scientific results which are unsurpassed in value even by the discoveries of our scientific age.

We wonder at the magnificent architecture of ancient Egypt and the splendid art which began in the great period of the

Old Kingdom, but there is much to suggest that the only reason why we think the people of Dynastic Egypt men of higher intellectual power than those who were before them is that they had discovered methods which secured the relative permanence of their works.

It has often seemed to me that anthropologists are mistaken when they take the modern savage as the equivalent of the early races from which the great races sprang. Those early races had in them the power which enabled them to lay the foundations, broad and deep, of all civilizations: the modern savage represents those who had not this power.

There has been much discussion of late on the nature and limits of what is called *Progress*. Is it inherent in the nature of things or is it not? Have we any reason to think that it must continue? I do not venture to give an answer to these questions. But of one thing we are certain: the history of the world as revealed by science does show an advance from primitive conditions to the highly complex world of to-day. The stages

in this advance may be noted in the following series: the formation of the Solar System; the cooling of the Earth, and its shaping into continents and seas; the emergence of conditions which made life as we know it possible; the development of the vegetable and animal series in parallel lines, the one depending on the other; the higher organization of animal life depending on the development of a complex nervous system; the emergence of man with his greater intelligence; the formation of human social life, carrying to a higher elevation and with larger psychical powers a social tendency already in existence; the passage from low human types, such as the Neanderthal, to higher types such as the Cro Magnon, and, after an interval, the great Neolithic races; and finally civilization in all its forms. It is quite clear that, looking back through a vista of immeasurable ages, we discern a very distinct progress. Whether our intellectual powers to-day are equal to those of the ancient Greeks—possibly they are not—is a question which does not count for much, when we consider

the vast periods over which our survey extends. It is indeed probably true that, our mental and moral powers being what they are, the future of the race depends upon ourselves and that we can make it or mar it by our actions. Yet the fact remains that science presents us with an account of a most amazing progress continued through incredibly long ages. Also, this progress is marked by a steady movement, as the complexity of organization increases, away from the purely material and towards the spiritual—the intellectual, the moral, the social. When civilization reaches a sufficient height we find that the better minds (as they seem) are occupied, not with the mere satisfaction of appetite, but with spiritual values: the true, the beautiful, the good, the holy.

Surely we feel compelled to believe that if there is some Power, which we call Creative, behind all this process, that Power must be one which seeks these higher values. It is hard not to think that there is what we call *Purpose* pervading the whole. It would indeed

seem to me that Purpose on the grand scale is indicated far more clearly by the tendency of this immense evolution than by the multitude of special adaptations which the Natural Theology of a former generation loved to trace out. Darwin endeavoured to show that Natural Selection could account for such special adaptations in a very plausible way, and however Darwin may be criticized, and perhaps corrected, his doctrine of Natural Selection survives. It is true that his account of the production of the useful variations has not stood the test of critical examination. But no natural selection can account for the whole vast evolution of Creation. It cannot account for the vast inorganic evolution which preceded the advent of life, nor can it account for the emergence of those variations in living forms which give it opportunity. Natural Selection is a sifting process and a fixing process. It is nothing more. All that is really creative must be pre-supposed before its process begins.

It is just here that recent science has been of late introducing fresh knowledge

—knowledge of a new and very astonishing kind. I desire especially to direct your attention to the remarkable exposition of this new knowledge which has been made public in the Huxley Lecture delivered in 1923 by Sir Arthur Keith and published as a Supplement to *Nature* of August 18th. Here you will find evidence, which has been accumulating in recent years, summed up, and co-ordinated, and made available for those who can make no claim to be specialists in the difficult studies of which it is the outcome. It is strange to read that it was Huxley who questioned the doctrine held by Lamarck, Spencer and Darwin, that "functionally wrought" modifications could become hereditary. He refused to believe that, for example, "a Simian stock, using its arms and hands as man uses his, would, in the course of many generations, come to have human hands and arms." He disbelieved absolutely in "use-inheritance," as it has been called. Here he anticipated Weismann, holding that the "creative machinery of evolution lay in the womb

of the germ-plasm." The whole trend of investigation since that time has, Sir Arthur Keith tells us, justified this statement. He writes : " The evolutionary machinery which has given man his brain, his hand, his foot and his posture, has worked out undisturbed by the surrounding conditions of life."

It was very interesting to me, as I read Sir Arthur Keith's Lecture, to find that he quotes with the highest approval a criticism of Darwin made shortly after the publication of the *Origin of Species* by the late Mr. Joseph John Murphy, of Belfast, a thinker to whose friendship and stimulating thought, may I venture to say, I owe much inspiration. Mr. Murphy cited the eye as a structure which could not be accounted for by any theory of selection then propounded. " It is probably no exaggeration to say," wrote Mr. Murphy, " that in order to improve such an organ as the eye at all, it must be improved in ten different ways at once, and the improbability of any complex organ being produced and brought to perfection in any such way

is an improbability of the same kind and degree as that of producing a poem or a mathematical demonstration by throwing letters at random on a table." Darwin felt the force of this criticism so much that he endeavoured to deal with it. But the research of the years which have passed since this controversy took place has justified Mr. Murphy's argument. If instead of saying that to improve the eye at all it must be improved in ten different ways at once, Mr. Murphy had said " in ten thousand ways at once," he would have been inside the mark. So says Sir Arthur Keith, and adds " We cannot conceive how the countless elements which go to the construction of an eye can assume their appropriate place, form and function, unless we postulate a machinery which regulates the development and growth of every one of them." The making of an eye is not then the conjunction of a number of happy accidents sifted, co-ordinated, and their resultant made permanent, by Natural Selection. It is a result for which preparation of the most elaborate kind

has been made beforehand, and which only when produced is subjected to the sifting process of Natural Selection.

It would be impossible for me within the compass of this Lecture to present you with any adequate summary of the argument, founded on the broad basis of observed fact, by which this great conclusion is established. Sir Arthur Keith passes in review the co-ordinated movements by which the countless millions of cells of the various sorts which form the distinct elements in the bodily system take their place in the building up of the organism with a view to its future functions. These cells are like great armies of workers moving in relation to one another, each class doing its appointed duty, and always for an end which is far in the future. The most important adjustments on which all future functions depend take place in the earlier ante-natal stages of development. In these stages, we can watch "evolution at work" and see that "its machinery lies in the forces which regulate or control the migratory movements" of the young cells. And the

cells which build up muscles, and nerves, and those which build up bones, and all the various organs of the body, all work in harmony with one another. "We have to postulate that in the human embryo there exists a machinery which co-ordinates the development and growth of all the diverse hordes of embryonic cells concerned in the formation of man's spinal mechanism," for example, "and causes them to move in a direction which, at all stages of evolution, yields a harmonious functional result." This leads on to a statement of the theory of hormones, which is thus described: "We are justified on all grounds in looking upon the human embryo, in the earlier stages of its development, as a colony of protoplasmic units, or cells, organized under a system of government controlled by hormones. Each member of the colony, we must suppose, has the power of circularizing, by means of the hormone postal system, some or all of the other members of the colony in such a way as to notify its needs and compel their co-operation." This "system of hor-

mones, which controls and co-ordinates the growth of various organs and parts of the body, is organized, like the nervous system, on a reflex basis. There are reflexes of growth just as there are reflex actions of muscles; both kinds of reflexes serve definite purposes in the economy of the body. The glands of internal secretion provide substances which control the action of organs and of parts of the body: they also produce substances which co-ordinate the growth of the organs or parts concerned in these actions."

Now I know that it is held by great authorities that these wonderful processes which thus rule the movements of the cells in their various functions and co-ordinate all activities within the body are essentially physical—chemical and mechanical. At a later stage in our enquiry, I think I shall be able to show you that, if this be so, it makes no difference at all as regards the ultimate interpretation of the whole system. Sir Arthur Keith himself helps us to understand this when, after considering certain disorders, he writes, "We cannot conceive how

such disorders of growth could be so sharply limited to a single functional system unless we agree that the machinery which regulates growth and development is organized, not on an anatomical, but on a functional basis."

It used to be said that, in its ante-natal life, the human creature recapitulates all the stages through which the evolution of the earlier forms of life passed on their way to its production. Some of the first advocates of the Darwinian theory, for example Haeckel and Huxley, made this statement one of the corner-stones of their teaching. Now we are told that no one who is sufficiently equipped with the knowledge of recent discovery will agree with these teachers. While all hold "that man, like all animals, has been evolved from the simplest of beginnings," the fact is that every one of the transitional stages through which the human organism passes in its ante-natal life "represents a new form of being, never one of which has been seen at any stage of the world's history leading an independent adult existence. Every organ

and part of the human body passes through an extensive series of developmental changes which receive a full and adequate explanation from the theory of evolution, but not one of these changes, from the first to the last, copies a form seen in any adult animal; at every point of development old or recapitulatory phases are masked by the unceasing introduction of new and individual features." The student . . . is impressed, not by any recapitulation, "but by the manner in which new features are being intercalated. Such facts favour Huxley's view that the machinery of evolution works in the body of the embryo uninfluenced by adult experience."

And now comes the most extraordinary result of all. It seems to be conclusively proved that those features of man's bodily structure which subserve his high status in the animal world, all that was necessary in body and capacity of brain to make him supreme among living things, all that made him fit for a fully human and civilized life, all that furnished him with a physique adapted

to a social and spiritual existence: all these were worked out in detail and prepared countless ages before he had need of them. It would appear that hundreds of thousands, possibly millions, of years before these structures were required, the appearance of them in due time was provided for in the ante-natal stages of those developing forms out of which man arose. Those stages were far more a prophecy than a recapitulation.

Note how this wonderful fact has emerged. When the ante-natal stages in the growth of the anthropoid apes are compared with the corresponding stages in man, it is found that the beginnings of all that is characteristic of man are found far back in the life-history of the anthropoids, and that the characteristics which distinguish the anthropoids from man occur much later. This, you will see, shows quite clearly that man is not descended from any of those anthropoids which are represented by existing species; but that very far back in the development of the life-series, preparation was made

for characteristics which were not required until man appeared.

Among these typically human characteristics are the large brain capacity—the brain of the baby gorilla is almost as large as that of the human baby; the downward bend of the front part of the base of the skull, which ultimately fixes the position and character of the human face; the forehead; the large head poised on a long and relatively slender neck; the hairless skin; all these are found in early stages of the life of the anthropoids. In them, in the later stages, when these creatures are being prepared for the life they have to live as free individuals, all these quasi-human features disappear, or become masked by the super-addition of the coarser animal features which correspond to their way of living.

So far does this go that, in early stages of the ante-natal life of these creatures, there appear the characteristic physical features of those human races which we regard as the highest : fair hair, smooth skin covered with a short, almost invisible down, long and fine hair on the

scalp, skin almost free from pigment. It appears, in fact, that Nordic man, the fair-haired Achaean, the great adventurous race, which in time subdued the fairest regions of the earth and created the noblest civilizations, was shaped and coloured not amid Scandinavian snows, but far back in the dim womb of time, and preserved, through countless generations, until the epoch for his birth had come.

II

THE MYSTERY OF LIFE

MAN lives in two worlds. First, his bodily organism is part of the material world. It is composed of material particles organized in a special way and adapted to its physical environment. Marvellously subtle in its construction, this bodily organism is, so far as science can determine, a complicated system by which energy, derived from the world without, is used in the service of all those processes which we call vital. Action, re-action and inter-action, physical and chemical in their nature, may be said to sum up these processes which subserve the functions of our organic existence. What is the process of sight but the impinging of certain vibrations on the retina of the eye, the transmission of other vibrations to the brain, and the completion of the process by a corres-

ponding re-action? What is the process of sound but the reception of vibrations of a different sort by certain fibres in the ear, with a somewhat similar transmission and reaction? What is that wonderful combination of the heart and its blood-vessels, the lungs with their oxygenating arrangement, the digestive organs with all their subsidiary apparatus, but an interlacing and mutually dependent system of mechanical contrivances by which the body derives its energy from the external world and is kept in repair. It is apparently all mechanism and chemistry. To those who fall into the habit of thinking of man in this way, he seems to be a very complicated material construction and nothing more. The doctrine of pure materialism seems to such minds almost inevitable.

There is, however, another world in which we live. The mind can turn from the contemplation of material things and observe itself. We look within, as we say, and find a wholly different order of reality. We discern thoughts, feelings, memories, imaginations, impulses, hopes,

fears, desires, determinations. This is the realm of consciousness. To this world of consciousness also belong certain elements which are very closely linked with the material world—sensations and perceptions. Colours, sounds, impressions received by touch, sensations of heat and cold, pleasure and pain : these things take their place in the whole of our conscious life. In no other way can we know them, and connect them with the rest of experience. Yet they arise, as a rule, from the contact of our material organism with the outer world, or from the material organism itself.

When we begin to explore the inner world of conscious experience we find that it is just as various and as complicated as the outer world of material things, and much harder to examine and to understand. The things which it contains lack the clear-cut precision, the separateness, of the things of the outer world. The latter are all in space and therefore stand apart, the former blend and interpenetrate. At first this contrast may be difficult to grasp ; but anyone who has

tried to master modern psychology in any of its many departments and then turns to a treatise on physics will recognize it at once.

Of these two contrasted worlds, with their distinct characters, the physical and psychical, it is essential to observe that while the physical is far the easier to grasp and understand, the psychical is the nearer and that which carries with it the surer warrant of its reality. Our thoughts belong to the inner world of conscious experience, and it is only by means of thought that I can know anything at all. Further, Thought and Will are inseparable; for I cannot think without an act of attention and an act of attention is an act of Will. Also I cannot will without thought, because to will I must present to myself some aim or purpose, and that is impossible except as conscious thought.

I might go on to speak to you of the vast and but partially explored realm of sub-conscious, or as it is sometimes termed, unconscious, mentality, which lies below what has been unhappily

called the threshold of conscious experience; but this would take us too far. I merely note it as a fact—a fact recognized by psychology.

Here then are two great departments in our experience. First—I now put it first—the realm of mental existence, dominated and distinguished by conscious will. Secondly, the material world of which our bodies are a part, dominated and distinguished by physical energy, or material force.

We may, I conclude, take these two realities as basal facts, and as, each in its own realm, an ultimate principle of explanation. For physicists, Energy or Force is the ultimate—though it is necessary to point out that those who accept the theory of Relativity are now subsuming Energy under a higher principle, which they term Action. For all who start with the facts of the inner world, Conscious Will is, I hold, the ultimate principle. Each of these is certainly in its own sphere a *vera causa*.

Regarded in this way the two realms seem to stand apart in sharp antithesis.

Yet, when we consider them further, we find that, somehow or other, they meet and, it appears, interact in the living body. Here is a territory which belongs to both. It is the instrument of mind: it is also a material structure dependent on the transformations of physical energy. The old problem of body and mind, and the relation between them, confronts us. I do not ask you to turn aside to consider this great question. Our task is a different one: it has to do with that which seems to be midway between the material and the spiritual—the principle which we call Life. What is Life? No more difficult question could be asked, yet it is one to which many of the best intellects of our time are turning with eager interest and not without hope of making some progress towards its solution. Biology, the study of living forms, is making a rapid advance.

One school of thought there is which has attained to enormous popularity. Its phraseology is finding its way into the newspapers and its central idea is providing themes for the stage. It speaks of a Life-Force. Technically it is the

doctrine of Vitalism. Life, according to this doctrine, is a special kind of energy or force. Entering into the material world, it produces a new type of organization, and creating form after form in endless variety, it sets in motion the whole process of evolution, reaching its highest point in man. So far, that is; for why should man as we know him be the end of the process?

This doctrine has been presented in many ways; two types of it, however, stand out eminently. I refer to the unconscious will of Schopenhauer, a doctrine now being revived in many quarters; and the *élan vital* of the distinguished French philosopher, Henri Bergson. Between these two are vague theories which partake of both.

It would be impossible for me to discuss these doctrines at length. All I can do is to show you, as briefly as possible, that the progress of discovery is decidedly unfavourable to both. I may add that, so far as I can discover, the teaching of all the greatest authorities is more and more definitely opposed to

every such conception—to the Life-Force as an explanatory principle, in any form which it can assume.

In the year 1922, at Hull, Sir Charles Sherrington, President of the Royal Society, and for that year President of the British Association, delivered a very important address on *Some Aspects of Animal Mechanism*. It created a great deal of interest at the time, and aroused some criticism and opposition; because it was taken to point the way to a purely mechanical interpretation of the phenomena of Life. This, I think, was a mistake; for the President was careful to point out that the ultimate problem remained, and that "for the observer himself the physical phenomena he observes are in the last resort psychical." That is, it must always be true that matter and mechanism can be known by us only in terms of mind.

Apart from this consideration, however, the whole purport of his argument was to show that, as regards the "how" of the working of the animal organism in all its parts, the advance of scientific

investigation was revealing more and more that the processes of the body are mechanical and chemical. He showed how the circulating medium, "the blood, is kept relatively constant in its chemical reaction, despite the variety of the food replenishing it and the fluctuating draft from, and the input into, it from the various organs and tissues." He traced the amazing adjustments by which the muscles, under the direction of the nervous system, preserve the living creature in the necessary posture. He explained the mechanism by which the line of gravitation is used in order to bring all parts of the body into a relatively stable position, no matter what part is moved in any direction. He pointed out how each new discovery of subtle mechanical and chemical explanations of vital facts leads on to others. Sex-determination can now be traced to a visible distinction between certain nuclear threads, a system that "extends throughout the whole body to every dividing cell." As regards muscle contraction, it has been discovered that Nature has made

" a motive machine " of " high mechanical efficiency " " out of white of egg, some dissolved salts, and thin membrane." Further, " Knowledge, while making for complexity, makes also for simplification." So it has been with the understanding of the mechanism of reflex action. I cannot venture to follow Sir Charles Sherrington in his discussion of the nervous system, in which he shows that " features of nervous working resemble over and over again mental activities," and that " decade by decade the connection between certain mental performances and certain cerebral regions becomes more definite." " The nervous system," he tells us, " is that bodily system the special office of which, from its earliest appearance onwards, throughout evolutionary history, has been more and more to weld together the body's component parts into one consolidated mechanism reacting as a unity to the changeful world about it. More than any other system, it has constructed out of a collection of organs an individual of unified act and experience. It repre-

sents the acme of accomplishment of the integration of the animal organism. That it is in this system that mind, as we know it, has had its beginning, and with the progressive development of the system has developed step for step, is surely significant. So it is that the portion in this system to which mind transcendently attaches is exactly that where are carried to their highest pitch the nerve-actions which manage the individual as a whole, especially in his reactions to the external world. There, in the brain, the integrating nervous centres are themselves further compounded, inter-connected, and recombined for unitary functions. The cortex of the forebrain is the main seat of mind."

Perhaps even more striking, from this point of view, are the discoveries which have been made in recent years, of the part played by chemical processes in the co-ordination of organic functions throughout the body, both in its growth and in its repair and maintenance. Professor H. F. Osborn, in his remarkable and delightful work, *The Origin and Evolution*

of Life, published in 1918, worked out in some detail and with extraordinary wealth of illustration, a great scheme of a mechanistic interpretation of the whole evolutionary process. The main problem which he presents for solution is the method by which co-ordination is secured among the multitude of various functions of the different elements which combine together to form the unity of a living organism. To every element corresponds its own appropriate action and reaction. How is such inter-action among all these functions maintained so that with every fresh adjustment, every exercise of function, the unity of the whole, the proper correlation of all the parts, never fails. It is apparent that here we touch upon a question of supreme importance for our present enquiry. For it is here above all that we seem to require the agency of a Life-Force. It appears that there are messengers which circulate throughout the body making every physical process keep its due proportion in relation to every other. Here, we say at once, must be traced the operation of an agency

which cannot be mechanical or chemical. It must surely be of another order of being—something different from any material substance or process. Yet what do we find ? These wonderful messengers are chemical in their nature and mode of operation. They are various in their character and way of acting, as described by Prof. Osborn, and are variously named by physiologists. In general they are termed *Hormones*.

Professor Starling, in the Harveian Oration, delivered in October 1923, and published in *Nature* of the 1st December of that year, gives what I take to be a summary of the most recent knowledge on this subject. He is, I believe, the original discoverer of the hormone system and the highest authority upon it. "The typical hormone," he tells us, "is a drug-like body of definite chemical composition, which in a few cases is actually known, so that the substance has been synthesized outside the body." "Each specific hormone is manufactured by a group of cells and turned into the blood, in which it travels to all parts of the body,

but excites definite reactions in one or a limited number of distant organs. The production and action of these substances are continually going on in the normal animal. They are necessary to health, and their production in excess or in deficit gives rise to disease and maybe to death." Having shown that the process of digestion depends on the due circulation of its proper hormone, Professor Starling goes on to describe the action of the ductless glands. Of these the thyroid is the most familiar example. "The physiological action of its internal secretion and the morbid results of its excess or deficiency, affecting tissue growth and development, metabolism, and mentality, are familiar to all. In recent years the active substance has been actually isolated, and its constitution determined by Kendal." And this is not the only instance in which the action of a hormone produces mental effects. Another "secretion is poured into the blood during conditions of stress, anger or fear, and acts as a potent reinforcement to the energies of the body. It increases the tone of the blood-vessels, as well as

the power of the heart's contraction, while it mobilizes the sugar bound up in the liver, so that the muscles may be supplied with the most readily available source of energy in the struggle to which these emotional states are the essential precursors or concomitants." "Wonderful, too, is the influence exerted by the secretions of the pituitary body. This tiny organ . . . consists of two lobes which have different internal secretions. That produced by the anterior lobe seems to influence growth, excess producing gigantism or acromegaly, while deficiency leads to retarded growth and infantilism." The posterior lobe secretes substances which have the most diverse influences on various parts of the body.

As Professor Starling points out, "these are not merely interesting facts which form a pretty story." "We are here investigating one of the fundamental means for the integration of the functions of the body." Here also are disclosed means for the control of the processes of the body and for the mastery of disease. "Already," he writes, "medical science

can boast of notable achievements in this direction. The conversion of a stunted, pot-bellied, slavering cretin into a pretty, attractive child by the administration of thyroid, and the restoration of normal health and personality to a sufferer from Graves' disease by the removal of the excess of thyroid gland, must always impress us as almost miraculous."

Such discoveries as these certainly lend an extraordinary persuasiveness to Professor Osborn's theory of the organism as a complex of energies. And these energies, according to his view, reveal no need of any Life-Force, Entelechy, or *élan vital* to direct them. On the contrary, the evidence which he marshals seems to negative every such supposition. Comparing the evolutionary development which has taken place in many series of animals belonging to all the great classes of vertebrates in response to twelve different kinds of environment, he finds repeated evidence of "their continuous powers of ever-plastic adaptation, not only to one kind of physical and life environment, but to any direct, reversed,

or alternating change of environment which a group of animals may encounter, either on its own initiative or by force of circumstances. In the large vertebrates we are enabled to observe and often to follow in minute details this continuous adaptation not merely in one, but in hundreds and sometimes in thousands of characters." "The evidence for this continuous and more or less adaptive direction in the simultaneous evolution of numberless characters which can be observed only by means of an ancestral fossil series was unknown to the master mind of Darwin during the preparation of his *Origin of Species*."

It might appear that this kind of evolution could best be explained by some internal principle or Life-Force. But Professor Osborn holds that there is positive disproof of any such supposition, for how can we suppose an internal impulse in a determinate direction to produce adaptations corresponding to reversed or alternating conditions in the environment. "The conclusive evidence," he writes, "against an *élan vital* or in-

ternal perfecting tendency, however, is that these characters do not spring up autonomously at any time; they may lie dormant or remain rudimentary for great periods of time."

The general conclusion is that, whether with the physiologist we consider the actual processes of the living body, or with the biologist we consider the evolution of living forms, the whole tendency of recent scientific discovery is in favour of the mechanistic view of the processes of life and against the Vitalists who think it necessary to postulate a specific Life-Force.

Professor Bergson does not class his doctrine with those theories of the nature of life which are included in the term Vitalism. Yet for our present purpose we must so class it, because it seeks an explanation of the phenomena of living forms in a principle which is neither that of mechanism nor that of supreme creative mind. It is midway between these two. He speaks of Creative Evolution. Reality, in his view, is movement, change, the onward impetus, the *élan*

vital, as he names it. This is, for him, the true concrete. All the rest of the universe of Nature, as we regard it, is but the arrest and detailed analysis by means of spatial imagery of this reality. As showing this he points to "the contrast between the infinite complexity of the organ and the extreme simplicity of the function." "The eye," he writes, "with its marvellous complexity of structure, may be only the simple act of vision, divided *for us* into a mosaic of cells, whose order seems marvellous to us because we have conceived the whole as an assemblage. If I raise my hand from A to B, this movement appears to me under two aspects at once. Felt from within, it is a simple, indivisible act. Perceived from without, it is the course of a certain curve, A B. In this curve I can distinguish as many positions as I please, and the line itself might be defined as a certain mutual co-ordination of these positions." "We may compare," he continues, "the process by which Nature constructs an eye to the simple act by which we raise the hand." "Nature has had no more trouble in

making an eye than I have in lifting my hand. Nature's simple act has divided itself automatically into an infinity of elements, which are then found to be co-ordinated to one idea, just as the movement of my hand has dropped an infinity of points which are then found to satisfy one equation."*

May I venture to say that, from a philosophical point of view, this argument seems to me to be perfectly sound. But the whole force of it is surely derived from the fact that M. Bergson takes, as his illustration, the conscious experience of a personality in action. As long as he is dealing with action of this kind he seems to me to be opening up a line of thought which is of the profoundest value and importance. But when we turn to the summing up of his whole discussion of this subject in the first chapter of his *Creative Evolution*, we find that he is applying the argument drawn from the living experience of a personality in action to something quite different. Behind all this wonderful movement of

* *Creative Evolution*, p. 97.

life which produces such organs as the eye or the hand is, according to him, but an original vital impulse. "Life is," we read, "more than anything else, a tendency to act on inert matter. The direction of this action is not predetermined; hence the unforeseeable variety of forms which life, in evolving, sows along its path." The *élan vital* is as the term implies, just a push behind, a *vis a tergo;* involving indeed a "rudiment of choice," but, take it all in all, nothing more than a semi-conscious striving against an opposing inertia.

Such a doctrine as this I take to be essentially a form of Vitalism, and as such I think it is open to the objection to which all doctrines of the kind are open: it postulates an agency which is not known to be a *vera causa*. Finding strange effects which seem to be inexplicable by known causes it assumes the existence of a Force of another kind—a force which neither in the laboratory nor in the experience of the conscious mind can be brought to the test of actual examination. As Dr. J. S. Haldane declares in his

very valuable book, *Mechanism, Life and Personality*, "the hypothesis of the vitalists has been shown to be unproved, unintelligible, and practically useless as a scientific hypothesis."

Having reached this conclusion, we must now turn back on the mechanistic doctrine of Life which seemed to issue from the evidence which I endeavoured to set before you. We saw, in a most wonderful way, mechanism and chemistry driving the Life-Force from point to point in the explanation of the processes of the body. Mechanism seems to be triumphant. But let us reflect. If this living body of ours, in all its processes and functions, is nothing but an extremely complicated and perfectly ordered mechanism, we are surely bound to think of it as in its essence an unconscious automaton. Consciousness has nothing to do with its activities. That flickering light of our being might conceivably be extinguished and everything would go on as if nothing had happened. An automatic lecturer would proceed with the delivery of a series of lectures to an assembly of

automata. Or, regarding consciousness as an undeniable fact, must it not be, as it has been termed, an epiphenomenon —something added—a phosphorescence playing over the surface of a mechanical necessity with which it has no essential relation or interplay of operative effects.

Against this last supposition is the unanswerable objection, as I think, that the most highly developed parts of the body—the brain, the eye, the ear and so on—are constructed for the very purpose of subserving the mental processes of the conscious life. If these subtle mechanisms were evolved only with relation to complex transformations of physical energy, why should the eye provide images which could have no meaning except for consciousness, and why should the brain provide a sort of telephone exchange by which messages from the outside world can be subjected to reflective thought before the appropriate response is decided upon. Unless these arrangements are purely delusive, the bodily organism must be an intermediary between the realm of conscious thought and the realm of

mechanism. That it is so every reasonable being must assume as a matter of practical convenience, even if he venture to deny it when he turns to purely theoretical considerations.

It is very important that we should face quite candidly and with clear vision the question which has been more and more definitely emerging from our discussion —suppose it proved that all the processes of our bodily life, when regarded from the side of physiological science, are found to be within the circle of mechanical and chemical transformations, are we forced to deny the existence of a spiritual life of which the bodily organism is the instrument? It is, I think, very important to observe that there are some among the most illustrious of scientific and philosophical thinkers who have had no difficulty in combining these two conceptions. To Hermann Lotze the hypothesis of a Life-Force seemed beset with insuperable difficulties. He held that "the realm of life is divided from that of inorganic Nature, not by a higher force peculiar to itself, setting itself as something alien

above other modes of action, not by wholly dissimilar laws of working, but simply by the peculiar kind of connection into which its manifold constituents are woven."* It is one of the themes of his great work, *The Microcosmus*, that the unity of Body and Mind arises from something far deeper than the juxtaposition or intermingling of two alien systems of forces. A thinker of our own time, Prof. Wildon Carr, in his *Theory of Monads*, approaches very closely, in many respects, to Lotze, in regard to this question, though claiming connection also with the philosophy of M. Bergson.

It is not, however, my intention to inflict upon you a prolonged philosophical discussion of this problem. I ask your attention to a fact that stands out with unmistakable clearness in all the instances I have given you from the writings of the most distinguished physiologists and biologists of the day; it is this: in every form of life, in all its developments from the simplest to the most complex, Function

* *Microcosmus*, Bk. I, Ch. III. (Trans. Hamilton & Jones.)

is dominant. As energy controls all material arrangements and shapes the forms which they assume, so does function control all the parts and characters of an organism and determine their development. Now function is activity adjusted to the attainment of definite ends; it is the activity of an organ which exists for the purpose of attaining those ends. Function is essentially purposive. The function of the eye is to see, the function of the hand is to grasp, the function of the foot is to stand and to walk. Every organ of the body, in every living thing, is what it is because it serves some purpose in the economy of the creature's life, or because it has served some purpose, or will serve some purpose. Apart from purpose there can be no such thing as function, and no such thing as a living organism.

Further, the purpose involved in the activity which is the exercise of function may be one of which the living creature has some consciousness or it may not. When I direct my attention upon some external object in the exercise of the function of sight, I do so consciously.

My purpose is to see the object and so relate it in some way to my own life as as an object of desire or interest. When a dog leaps forward in pursuit of a rabbit, or a cat watches a mouse, or a fish starts aside as the shadow of a human figure falls upon the water, function is consciously exercised. Or, to go very far down in the scale of life, when an amoeba folds itself round a particle of food, or when a sea-anemone which formerly relished bread refuses it after having tasted beef, there is certainly a suggestion of some conscious element in the operation. It is, I suppose, impossible for us to be certain, but I observe that biologists seem inclined to trace the element of conscious choice much further back in the life-series than was formerly customary.

On the other hand there are endless purposes served by the functions of living organs which do not enter into the consciousness of the organism at all. So it is with most of the vital processes of our bodies. Here some psychologists trace, in many instances, the activity of

unconscious, or sub-conscious, mind. Into the value of that hypothesis I do not ask you to enquire. My aim in pointing out the distinction is to bring out a truth which is, I think, now clearly indicated; it is this: the whole development of living things in all their infinite variety of forms is permeated and guided by a purposive direction which passes far beyond the agency of any organism and beyond the grasp of any human mind.

Let me quote for you some sentences from Sir Arthur Keith's Huxley Lecture in confirmation of this statement. Giving instance after instance of the marvellous way in which, in the embryo, the various kinds of cells which go to form the muscular system are organized and directed, he writes, "The migration of origin, on the part of the embryonic muscular cells, is of a useful or purposive kind. We cannot avoid the conclusion that the growth and development of young muscle cells are controlled by influences or means which work towards a functional result." Again, writing of the way in which the cells group them-

selves in order to prepare the human foot for its proper work, he says, " The tendon fibres have broken away from those going to the toe and migrated backwards along the outer border of the foot, thus giving them an advantageous position for the performance of their function in walking. We have here all the properties manifested by developing muscle masses —a power of cleavage or separation and a power of migration. What causes these outer muscle cells which are destined to act on the most external of the digits to break from the parent mass and assume a separate functional identity ? I agree (writes Sir A. Keith) with Huxley that there are no grounds for believing that the behaviour of embryonic muscle cells is in any way influenced by experiences gained by adult muscle fibres. When vertebrate limbs came first into existence the muscle colonies which deployed to form the extensors of the toes grouped themselves so as to get a functional result."

In a similar way, Sir Arthur Keith deals with the movements and grouping

of the cells which form bones. As regards the spine and the wonderful mechanism connected with it, he writes : " We have to postulate that in the human embryo there exists a machinery which co-ordinates the development and growth of all the diverse hordes of embryonic cells concerned in the formation of man's spinal mechanism and causes them to move in a direction which, at all stages of evolution, yields a harmonious functional result." " Only one theory affords," he continues, " a rational explanation of how such complex adaptations can be brought about—the theory of hormones postulated by Starling in 1905." This theory I have already mentioned and shown how wide is its application. But we must observe that it is essentially a theory of physical process, and can, in no way, provide an explanation of the fact, which has now become abundantly evident, that in the organization of the processes of life, function is always presupposed. The function is the creative thing : the mechanism is the means employed. Function explains the hor-

mone system and not the hormone system the function.

Even those authorities who have, most of all, striven to demonstrate the mechanistic theory of life are being driven to recognize the priority of a directive principle or law. Thus Prof. Osborn, having examined the rival Lamarckian and Darwinian explanations, rejects both and declares that the evidence which is now available from palaeontology and experimental zoology shows that "continuity and law in chromatin (i.e., germ-cell) evolution prevails over the evidence either of fortuity or of sudden leaps or mutations, that in the genesis of many characters there is a slow and prolonged rectigradation of direct evolution of the chromatin toward adaptive ends. This," he adds, "is what is meant in our introduction by the statement that in evolution law prevails over chance."

Translate this into simpler language, and what it means is this—that from the beginning the course of evolution, along its main lines, has been directed by a definite purpose. It is not the outcome

of the chance collision of atoms and the accidental competitions of living forms. Nor was it produced by the mere push of an aimless *élan vital*, or *vis a tergo*, forcing its way through an inert opposing medium. Nor again is it the accumulated result of the strivings of the multitude of living things, such efforts as those of the primitive deer to reach the higher branches of the trees on which it fed and by which, it has been supposed, that along one particular line of development it transformed itself into a giraffe. There is no evidence at all that by some such means man, in the future, will be able, if he so wills, to get "back to Methuselah." Nor further can we seek the explanation in the striving of an unconscious will. The purpose which guides evolution is far too clear and far too comprehensive for that. All these theories are either demonstrably false or manifestly insufficient. The one principle which can truly illuminate the darkness is that of a Supreme Universal Intelligence permeating and controlling the course of evolution—an intelligence compared with which our greatest

minds are as nothing. Take as an example the one amazing fact that hundreds of thousands of years before man appeared on earth the main characters of the highest type of manhood had been already sketched out, and were prepared, awaiting the time of his advent.

Let me add that it is no argument against this conclusion that, so far as it has gone, science has more and more demonstrated the existence of mechanical and chemical machinery by which vital processes are carried out; because it is the essential mark of intelligence in dealing with the material world to reduce its operations to mechanism. Mechanism in human hands is the very mark and token of the victory of mind over matter. It is singular that it should be regarded otherwise in natural operations. If it be true that all the processes of the body can be described in terms of mechanism, the correct inference is that conscious intelligence is the only possible explanation.

Further, here is the only conception which escapes the fatal dualism in the

scheme of Nature which results from every vitalistic conception. The Vitalist is the modern Manichean; he sets the Life-Force against mechanical Energy in hopeless antagonism. For him there is no escape from the ceaseless struggle between the powers of light and darkness. On the other hand, when we discern in the mechanism, whether of material systems or of living beings, the very sphere of purposive activity, the evolution of life is seen to be part of that all-embracing process to which belong the movements of the vast stellar universe as well as the growth of the smallest of living things—a process organized throughout by supreme intelligence.

III

GOD AND THE WORLD

The interpretation of the great life-process which we have now before us regards it as one with the universal process, the same in origin and the same in purpose, but involving a higher system of organization than is to be found in that relatively lower part of the creation which we call the inorganic. Faith in God as Creator—to use the old term—is, when rightly understood, essentially a monistic view of the world. It is therefore a mistake to think that this conception is the bringing in of a supernatural element in order to solve a scientific problem. Science deals with the world in a partial fragmentary way. Its aim is to link effect with cause in a purely natural series. It passes from step to step, or from narrower generalizations to wider, endeavouring to exhibit the world of nature

as a perfectly articulated whole. To bring in at any point in this system a supernatural element would certainly be a breach of scientific method. But it is altogether different when, rising above the scientific point of view we regard the natural process as a whole, and discern that it is impossible to explain it apart from the conception of a Universal Intelligence.

When the principles expounded by Newton enabled astronomers to display to a wondering world the stupendous mechanism of the heavens, the total effect was to convince mankind that the universe, being a mechanical system, must have a Maker. Even the worldly scepticism of the eighteenth century could not stand against that compelling argument. And when Paley applied the same principle to the marvellous adaptations of means to ends which he found everywhere in the realm of living things, its force was enormously augmented. Far more than we now realize, these proofs commanded the assent of thinking people, and inspired the revival of religion which marked the

latter part of the eighteenth century and the early years of the nineteenth. This effect lasted until Darwin's theory set free the great conception of organic evolution, and destroyed the belief in each species as a distinct creation. The doctrine of evolution also destroyed the purely transcendent conception of God as a mechanician, a great Designer and Maker of a vast multitude of cleverly constructed contrivances, fashioned by Him out of a given material.

Yet it is surely significant that we have once again come round to the conception of the world of living things as a system in which the most complicated processes of life are presumed to be explicable on purely mechanical principles. The only difference would seem, at first sight, to be this, that, whereas, a hundred years ago, the world seemed to be filled with millions of animated mechanisms, each going its own way distinct from all the rest, we are now led to think of the whole organic world as one infinitely intricate mechanism connected throughout by the indestructible germ-cells.

There is, however, a further difference : in former times the Creator seemed to stand apart from the world of living things; now, as we have seen, the whole of organic nature is discerned to be permeated throughout by an indwelling purpose. We can describe this purpose as immanent, if we care to use that hackneyed term. I confess I fear and distrust some of its associations. The essential point is that, while the whole organic series in all its parts is now known to be a unity, every link in the vast network of successive and contemporary forms, every organ and every creature, is what it is by virtue of certain functions which it has to perform, and function is always and everywhere purposive in relation to the individual and the whole. It is hard to see what this can mean but that one Universal Intelligence has guided the world-wide evolution of life and still guides it.

Having reached this conclusion we are in a position to ask the question, Can we deduce from our knowledge of creation as science has revealed it, any conclusions

as to the character of the Supreme Intelligence ?

The answer to this question which seems most obvious to those who take the facts as exhibited by science, and judge them by first impressions apart from traditional beliefs, is of an amazing, even appalling, kind. We seem to discern in the age-long welter of creation, in the incredible multitude of living forms, in the ways in which they struggle with one another and devour one another, in the cruelties which they practise as in many cases essential to their means of life, the work of an intelligence which cares nothing for the sufferings of the creatures it brings forth, delighting only in the exercise of a boundless creative activity. We seem to see a measureless imagination let loose to work its utmost along certain predetermined lines of development, quite regardless of either the pleasure or pain of the creatures which embody its ideas. We seem to come back again, but on a vaster scale, to the old Greek conception of gods to whom the joys and sorrows of men are of

no account, except as the sport of a changeful fancy, or who are completely careless. Nor can we exclude from our consideration the pleasures and pains of animate creatures other than humans. For we now know that we are all akin—we, living things of all kinds who inhabit the earth. Human beings have no longer the right to play the god—the pagan god—in relation to the humbler members of the family of sensitive creatures. In what a strange position are we all—we, living creatures! About us lies the vast universe with its immeasurable forces, and above us all, we cannot but feel, some supreme intelligent power which ever hides itself. For those of the family who have at last gained the ability to ask the question of the why and the whither, there comes no response, it would seem, but the echo of their cry.

There is only one way in which we can test the correctness of this terrible suspicion. We can apply to our new knowledge of the history of creation, the values which have emerged in the course of our human experience. Those values

are : truth, beauty, happiness, goodness.

It is not at once clear how we can make use of the first of these principles of value in relation to the Supreme Power. Truth is the principle which controls all the researches of science. It seems therefore to belong to the work of the enquirer who follows in the footsteps of the Creator rather than to the Creator Himself. Yet, when we consider the question further, we shall see that the quality of Truth may belong to work of every kind. There is artistic truth as well as scientific truth, and as the work of the artist is essentially creative we may find what we seek here. We can say of a work of art that it has the quality of truth when it is sincere, when, that is, it seeks to carry out its purpose, or express the ideas it has in view, to the full, not turning aside on account of difficulties in the use of its material or truckling to baser ideals. Truth in art is, in fact, trustworthiness in the pursuit of the proper ideal. When thus defined, artistic truth is essentially the same quality as scientific truth, and

that quality is directness of aim, the single eye, the firm purpose, the self-consistent activity. To such truth as this corresponds the moral quality of veracity—the attribute of one upon whom you can depend.

Now it is certainly an attribute of the Supreme Power which works in the Universe that He is trustworthy. The very idea of truth itself as that conception enters into scientific research is that there is a fundamental consistency in things—that the ultimate nature of the world is orderly. Upon this supposition every use of mind and body depends. All thought is based upon the postulate that confusion is not the final fact of reality. Further, the existence of science is the verification of this postulate. Science would be impossible apart from a settled order in things. The existence of such a settled order is the very meaning of the word "natural." And when, in its splendid progress, science demonstrates the existence of Natural Law, that is, of uniformities of cause and effect among natural events, it is adding continually

to the verification of the hypothesis with which it starts. Beginning with the assumption that what is true to-day will be true to-morrow, science gains, with every discovery, a fresh assurance that her labour is not in vain, that the foundation on which she builds is permanent, and that there is, in her work, that which will endure.

This glorious confidence of science and the great achievements which have been based upon it rest altogether on the faith that there is a final trustworthiness in the universe. We may, therefore, conclude that, so far as our observation extends, the value which we call Truth is not merely relative to our way of regarding things, but belongs to the character of the Supreme Power. Here is the fundamental postulate which underlies all human activities in relation to the world in which man lives. Those practical applications of human discoveries of the laws of Nature which have proved so effective in dealing with physical forces, which have enabled man to take his materials from the earth and use them

for the improvement of the conditions of his life; his employment of fire, of the metals, of stone, and wood; his creation of complicated machinery which has served his varied purposes, by which he has changed the surface of the earth, constructed his great cities, covered the ocean with his ships, gained multitudes of means by which his surroundings have been made more conformable to his desires and needs, and by which all the arts of civilized existence have been brought into being: all this immense range of achievements depends in the last resort on the trustworthiness of the Power, or powers, which Nature manifests. In view of this vast experience it seems eminently reasonable to attribute the value which we call Truth to the ultimate constitution of things.

Yet, when we consider the position of the individual life in relation to the whole scheme of the universe we may well pause in doubt. For, while the great universal scheme seems marked by this quality of trustworthiness, the particular living creature—the man, or the woman,

the beast, the bird, or the fish—seems to be an unconsidered thing, sometimes winning a short-lived enjoyment, sometimes crushed or torn, or utterly discarded, in the vast struggle of the ages. Of Nature, we may say with the poet,

"So careful of the type she seems,
So careless of the single life."

So far indeed as our argument based on the facts of the evolutionary process, and viewed in the light of the value we call Truth, can take us, it would seem that, while discerning a purpose which is indeed trustworthy in relation to the whole, we fail to establish a like basis for confidence as regards the individual.

The second value that we have to consider is that of Beauty. The full enjoyment of the beauty of the natural world seems to have been reserved for our own age. It is true that there are passages in Homer and in other primitive literatures which reveal an insight into the magical quality of natural beauty. It is true also that in the Middle Ages the ever-renewed miracle of the Spring excited wonder and delight. But the

realization of the overwhelming and universal beauty of the world seems to be a discovery of modern times. Sometimes Shakespeare anticipates it :

" Full many a glorious morning have I seen
Flatter the mountain tops with sovereign eye,
Kissing with golden face the meadows green,
Gilding pale streams with heavenly alchemy."

But it is not until the era of Shelley and Wordsworth that the full revelation comes. When this is seen, the whole world is transformed: and to the thoughtful mind comes the reflection that the Supreme Power of the universe seems to be much more concerned with the production of beauty, especially beauty of form and colour, than with the production of happiness or goodness. Nature produces the beautiful with a lavishness which finds no parallel in the works of man. And the beauty of Nature is not, as in human art, a form added to a material which is diverted from its natural con-

dition to serve the artistic purpose. The beauty of Nature is intrinsic, universal, penetrating. It springs into being through the inevitable working of natural forces. It is as perfect in the little as in the great, in the structure of the snow-flake or of the minute organism as in the Alpine peak or the sunset sky. It seems to be almost independent of rule or proportion, for, in Nature, the wildest confusion will produce beauty as certainly as the most perfect order or symmetry. The irregular heaping together of fragments to form a mountain slope, the raging of a hurricane at sea, the plunge of a cataract—all these are as inevitably beautiful as the perfect dome of the heavens or the delicate symmetry of a rose. Or, to take another illustration, it is often observed that colours which would be discordant if combined by art, are in Nature thrown together in seeming carelessness and produce the most delightful harmony.

It may appear, however, that this lavish beauty of Nature is entirely relative to our apprehension of it, and that therefore we are mistaken in attributing

it to the character of the Creative Power. This was Kant's criticism of the argument from Natural Beauty; and it is, at first sight, very impressive. But there are considerations of a very weighty kind which show that it is not conclusive. First, beauty of form depends upon the arrangement of parts, and there are but few arrangements out of thousands in any given case which will yield a result which can be called beautiful. How is it that Nature in the construction of the myriad forms which, for example, the leaves of plants assume, selects those combinations which invariably strike us as beautiful? The argument here is exactly similar to that employed by Mr. J. J. Murphy when he pointed out the impossibility of an accidental production of so complicated an organ as the eye; and, as we have seen, that argument has been completely justified.

Further, Kant based his objection on the fact that we invariably seek "the gauge of beauty in ourselves and that our aesthetic power of judgment itself acts in a legislative capacity with regard to

the judgment whether any object is beautiful or not." But, as Dr. J. H. Kennedy points out in his *Natural Theology and Modern Thought*, the fact that "we find the gauge of beauty in ourselves arises from the very nature of beauty, it holds good necessarily for beauty of every kind, for the beauty of Art as well as for the beauty of Nature, and therefore cannot be used to establish a distinction between them. In the case of Art, none, I think (he writes) will hazard the assertion that it enables us to dispense with the necessity of assuming that there has been an author of the work we admire; we may exaggerate as much as we like our own merit as percipients of its beauty, and may persuade ourselves that it is we who show favour to the work by admiring it, instead of its doing any favour to us; but all the time we know perfectly well that the idea which our mind perceives, as it is embodied in the object, could not be thus embodied there unless it existed previously in the mind of the poet, or painter, or sculptor."

These considerations show us that the

gradual discovery of the overwhelming beauty of the natural world is the awakening of our faculties to a whole realm of spiritual value which was there before we learned to enjoy it. The more our aesthetic powers are directed to this value and cultivated to an appreciation of it, the more universal in its range do we find it to be. What other conclusion can be drawn except this: that the Power which the universe manifests to us is of such a nature that, to it, beauty is an end in itself? Moreover, we must discern that our appreciation of the beauty of the natural world is a proof of some degree of kinship between that Power and ourselves. The Supreme Creative Intelligence appears, here again, as, above all, characterized by a boundless imagination, an imagination which pours forth, in infinite variety, forms which are always instinct with purpose. And one universal element in that purpose seems now to be clearly manifested—the realization of Beauty.

It is important here to point out that the beautiful in Nature cannot be ex-

plained as the useful. It is not explicable as a particular instance of the principle that variations which enable an organism to compete successfully with other organisms will be perpetuated. Darwin endeavoured to show that the bright colours of flowers may be due to the attraction of such colours for insects, and that the beauty of butterflies and birds is due to sexual selection. But, as has been often pointed out, the beauty of flowers is quite as much beauty of form as of colour, and the attraction of bright colours does not explain the delicate pencilling, shading and blending of tints. And, further, as Dr. Kennedy shows, "it is no longer the doctrine of Natural Selection which is offered in explanation here. The Survival of the Fittest has become the Survival of the Fittest to please." Insects and birds are credited with aesthetic powers of a very highly developed kind. But no explanation of this sort can explain the beauty of the inorganic world, the beauty of crystals or the glory of sunset skies. Nor can it touch the fact that the beauty of the world is produced in such

overwhelming profusion. This quality in things is, from a utilitarian point of view, perfectly useless, a waste product, poured out with infinite prodigality on a careless, unseeing world.

When we turn to the other values which, as intelligent beings, we are bound to recognize, we can hardly escape some measure of doubt and apprehension. What of happiness? And what of goodness? There is certainly a great deal of happiness in the world, and there is also no small amount of goodness. Happiness may be defined as the sufficient satisfaction of our natural and lawful desires and interests. In this sense, it is fulness of life; and fulness of life is, for every living creature, according to its capacity. Goodness, unlike happiness, is only for those living creatures which are high enough in the scale to have the faculty of conscious will and therefore to possess a moral nature. There can be little doubt that every creature which feels the urge of desire, even though it be only of the primitive desires which we call appetites, is capable of happiness.

Nor is it possible to watch lambs sporting in the fields without the conviction that mere living brings enjoyment. But goodness is on another plane of experience. It is sought, not for the happiness that it brings, but for its own sake. When moral insight dawns there emerges the consciousness that here is a value, the highest of all, which demands, if need be, the sacrifice of every desire.

Now we inferred from the universality of Beauty in Nature an important conclusion concerning the character of the Supreme Power. We concluded that it belongs to Him to seek the beautiful. Boundless imagination marked by an equally boundless aesthetic intention seems to be the principal characteristic of creative intelligence. But can we say that the Creative Purpose seeks with equal aim the realization of happiness in its creatures, or the realization of goodness in human life? Here is where heart-shaking doubt intrudes. For it is not merely that while there is a certain amount of happiness in the world of living creatures and a certain amount of goodness

in man's life, there is also a vast deal of unhappiness and an immense volume of evil. It is rather this consideration which creates doubt—that in the animate creation happiness, that is, the enjoyment which accompanies the satisfaction of desire, seems to be a means rather than an end. It makes each living creature seek certain ends which are necessary for its life, and for the continuation of its species. Here, once again, we seem to discern the sacrifice of the individual to the welfare of the race. Individual happiness is, it seems, an incident in the universal process and is only carried so far as is necessary for the furtherance of the great creative purpose. Beyond this limit we seem to discern pain, weakness, death.

From happiness we turn to consider goodness, and find an even more disquieting suggestion. When, as in man, conscious will awakens, there awakens with it a dominating egoism which would be utterly destructive were it not curbed by some other principle. The principle which thus emerges is the Moral Law. Among primitive peoples

this law appears as a system of taboos by which the individual is subordinated to the tribe and made to play his part in a commonwealth. When the tribe is merged in the Nation, Law in the fuller sense of the term makes its appearance. Under great rulers, such as the Babylonian Hammurabi, the law becomes an elaborate system of regulations governing the daily life, social organization, and mode of livelihood of the people. Religion elevates the law to a position of higher authority, and attaches to it a sense of reverence and awe. To Israel, the Law is the ordinance of the one Supreme Deity. In the more complicated conditions of the modern world, the moral law is viewed apart from the particular legislation of each state and assumes a relatively higher and more august authority.

Goodness is the quality of personal character which corresponds to the law. To the ancients it assumed the form of certain virtues which should mark the character of every man who was fitted to take his place in the social system to which he belonged. To the mind which

has grown up in the atmosphere of Christian tradition, goodness has become a much sweeter and purer thing. It is the quality of character which should belong to those who have made Christ their ideal and have learned at His feet. So it is that the great and holy conception of goodness has been given to mankind.

Deep in the heart of all Christian Faith is the conviction that goodness thus conceived is the very character of God Himself. This is the truth expressed by St. John in the words, "God is Love." It is the first principle of all our Lord's teaching when, in so many ways, He impresses upon us the thought of God as our Father in Heaven. Here is the very foundation of all Christian praying and living. "Our Father which art in Heaven!"

Yet when we consider the age-long process of creation as disclosed by modern science we may well shrink back in horror. The Creator who has made the world so beautiful has not made it good. There is indeed goodness among men, but it is always very imperfect; and, side

by side with it, is evil without end, lust, cruelty, selfishness, greed, treachery. In our judgment of values, goodness appears an immeasurably more important quality than beauty. Yet the God who made the world so beautiful has somehow not made it good.

A tremendous question is forced upon us : Is the aim of the Supreme Power in creation so remote from the values which we regard as the highest, that it is a matter of indifference to Him whether they are realized or not, or is there some other explanation of the pain of the world and of the awful evils which renew themselves with every generation ?

Pain and sin are the two great evils. The former is the negation of happiness, yet it is not a mere negation, for there is a terrible positiveness about the sufferings which sensitive creatures have often to undergo. When we think of the pain of torn flesh, the torture so often entailed by disease, the lingering sufferings of wounded things, the unceasing slaughter all the world over that other creatures may live, we get some impression of the

vastness of the volume of pain in the animal world. It may indeed be true—I think a careful weighing of the evidence will show that it is true—that on the whole there is more of happiness than of pain in animal life; for the periods of enjoyment are relatively long in most cases, and death comes suddenly as a rule, and without anticipation. Yet it remains that pain fills a very large space, and the infliction of it is essential to the continuance of many species.

When from the animal world as a whole we turn to man, we find that the quality of pain is greatly intensified, for man's higher nervous organization carries with it a far greater sensitiveness, and man suffers in anticipation and in recollection with a clearness and concentration unknown to lower intelligences.

Deeper than the mystery of pain is the mystery of moral evil. From pain we shrink, yet we willingly endure it for an end that we think worth the sacrifice. With moral evil it is otherwise. When once the moral faculty has been truly awakened, we discern that sin is an evil

which should never be willingly accepted. Yet God has so made our world that sin springs up afresh with every generation, nay, with every human life. Why has He not made His universe as good as it is beautiful? That is the supreme problem which ever confronts us as we endeavour to think out our relation to Him and consider our circumstances.

Summing up then the conclusions we have, so far, reached on this great question, we find the explanation of the process of creative evolution in the activity of a supreme directing Intelligence. Of this Intelligence it would appear that we are able to say that it is certainly conscious, for it lays down the main lines along which evolution is to take place far in advance. We found, for example, that the main characteristics of the higher human type were sketched out hundreds of thousands of years before that type was realized. To suppose that a mere *élan vital*, or the push of some unconscious volitional effort, or some life-force, could so anticipate its creations is absurd. But even clearer evidence, if possible, of the consciousness

of the Intelligence which is realizing its purposes in Creation is to be found in the Beauty of Nature. For here is a quality which has no meaning at all apart from the reflective mind which enjoys it. And this quality also impresses us with the informing, penetrating character of the Mind which gives it birth, for, as we have seen, the beauty of Nature is not a form added to a material diverted from its natural condition to serve the artistic purpose. It springs into being in an inevitable, effortless fashion in every process of natural formation. The aesthetic purpose inter-penetrates with all the other purposes of Creative activity in a manner which transcends all our experience. No wonder that Wordsworth, when thinking of the Immanence of God, puts first the Beauty of the Universe as the sign of His inhabitation, and marks how there comes to the contemplative mind

"a sense sublime
Of something far more deeply interfused,
Whose dwelling is the light of setting suns."

Whether this supreme Conscious Intel-

ligence which thus lives and works in the natural world should be described as a Person is a question which remains unanswered. It may be that the word Person is too much limited by its human associations to be employed with full significance. Here the difficulty which confronted us as we tried to test our induction by means of the value which we call goodness, warns us against a hasty conclusion. We have still to face the darkest, deepest, and most perplexing of all problems.

IV

GOD AND THE INDIVIDUAL

We have now attained to the vision of a great creative process directed, along its main lines at all events, by a Supreme Intelligence. But, so far as we have yet been able to see, the structure and organic activities of living things seem to be mechanical arrangements devised so as to subserve an infinite number of functional effects. Does not this view seem to reduce the living creature to a mere mechanical automaton? The question reveals the fact that we have still to deal with the nature of the Individual in relation to God above it, and the world of mechanism and chemistry below it, in the scale of being. And by the Individual is not meant the human Individual merely. The scope of our enquiry is much wider. It must include the individuals who form the various tribes of

living things of all kinds and degrees within the realm of organic nature.

In the first instance, however, the human individual claims our attention. Principally because he is the only one of all the multitude whose inner being is open to our inspection. Secondly because, as the highest in the whole series of life, he must reveal the inner quality of the nature of life most fully.

Very early in our discussion we said that there are two principles of explanation which must be accepted as *Verae Causae* and as, each in its own sphere, ultimate. They are: the principle of physical Energy which governs all explanation in the mechanical sphere; and the principle of Conscious Will which dominates the inner world of feeling, thought, and purpose. The latter is certainly the characteristic principle of the human Individual in his inner nature. Now the essential quality of conscious Will is a peculiar spontaneity of action which is in startling contrast with the rigidly determined movements of every mechanical system. I put forward here no

doctrine of Free Will. I do not enter into the controversy between the Determinist and the Indeterminist. We shall try to regard the spontaneity which we discern as characteristic of our nature in a purely common-sense way. There is obviously some very deep distinction between the activity of a machine in which every movement is physically determined, and the activity of a thinking being who hesitates between several courses, considers the possibilities, and finally decides. We call this latter sort of activity *choice* and we know by actual experience what the term means: we shall not trouble ourselves about the metaphysics of the process. Now the process which we call choice is very closely connected with the mechanism of the brain. This organ of the body has been compared to a telephone exchange. It certainly subserves the processes of reflection and selection. And as a telephone exchange exists for the messages which pass through it, and not the messages for the exchange, I think we are justified in concluding that the brain exists for the

purposes of thought and selection, and not the reverse. These processes are, in fact, the function of the brain, the very reason of its existence. It is therefore surely a much more reasonable thing to explain the existence of the brain by thought and selection than to explain thought and selection by means of the brain. But as the brain dominates the whole bodily organism it is hard not to conclude that in these inner experiences of thought and selection we have the truest index to the nature of the whole. In man, then, the mental activities of his inner life are the surest revelation of his true nature. And here, in this inner life, we find a unitary centre of feeling, thought and will, which is the pivot of all his activities. This is the characteristic quality of the human individual. Only after long training in reflection and mental analysis is man able to realize his personality, his self-hood. None the less, from the beginning of a truly human life, the unrealized consciousness of himself confronting the world is the centre of his activity. The self, observing, thinking,

choosing, enjoying, is the fundamental fact of human life. True it is that this self is always in relation to social life, and dependent upon social intercourse. Yet, though social existence is necessary in order to enable the individual to come to himself, the unitary centre which emerges is never the mere reflection of the social order around it. Dominated more or less by the customs of the tribe, the individual always preserves in himself a power of determination which is all his own. The tribe may limit his self-determination: it cannot destroy it.

Here is the very source, as we have already seen, of a moral order as distinct from the mere satisfaction of desire.

The principle which thus comes to light as the essential quality of the human individual in his full development gives us the key to the true nature of Individuality wherever it is found. In the inorganic realm there are no individuals. It is only by a poetic personification that the sun or the moon, the earth or the ocean, can be endowed with the attributes which constitute individuality. But the

humblest animal, and even plant, possesses this quality. How shall we define it? Professor J. Arthur Thomson in his *System of Animate Nature* deals with this problem in a manner which sets forth with convincing clearness the contrast between the organic and the inorganic. He notes what he terms the "insurgence of life," "a certain quality of 'push' or aggressiveness," "a native self-assertiveness." "It is an expression of the 'will to live,' or of the spirit of adventure."* The living creature is no mere passive object operated upon and pushed to and fro by the forces of nature. It is always, more or less, active in the making of its own career. As Professor Thomson says, "All living creatures—plants as well as animals—are active towards two main results, their own self-maintenance and the continuance of their race." He quotes with approval the definition of Roux, that "hard-headed founder of what he calls 'developmental mechanics,'" "who recognizes five elementary functions: (1) Self-

* *Op. cit.* p. 56

disassimilation; (2) self-preservation, including assimilation, growth, movement, feeding, etc.; (3) self-multiplication; (4) self-development; (5) self-regulation in the exercise of all functions, including self-differentiation, self-adjustment, self-adaptation, and in many organisms distinctly recognizable psychical functions."*

Activities which can be thus defined by severely scientific observers are certainly not merely mechanical. As Dr. J. S. Haldane puts it, "the idea of a mechanism which is constantly maintaining or reproducing its own structure is self-contradictory." These self-directed activities are truly described by the term *behaviour*. And behaviour is to be found very far down in the scale of life. Let me again quote Prof. J. A. Thomson. He writes, "Professor Jennings describes a large Amoeba, *a*, which had imperfectly swallowed a smaller one, *b*. The prisoner moved as if trying to escape, the swallower moved as if trying to prevent it. Finally the small one did get completely out again, whereupon the large

* *Op. cit.* p. 80, 81

Amoeba, *a*, reversed its course, overtook *b*, engulfed it completely, and started away. The small Amoeba, again imprisoned, lay still until through the movements of *a* there happened to be but a thin layer of protoplasm between it and freedom. It then broke loose, escaped completely, and was not further molested." Professor Thomson adds, "If this behaviour had been described and even drawn by a tyro, we might have distrusted it entirely, but when we have it from a master in the difficult art of observing Protozoa, we must give it careful consideration. Without saying anything about the Amoeba's mind, must we not agree that this concatenation of following, catching, losing, chasing, re-capturing, and losing again, is either behaviour or magic."*

This truly wonderful example does not stand alone. It can be paralleled in many other instances quite as remarkable. Professor Jennings says that he is "thoroughly convinced after long study of the behaviour of this organism, that if the Amoeba were a large animal, so as to

* *Op. cit.* Vol. I, p. 98

come within the everyday experience of human beings, its behaviour would at once call forth the attribution to it of states of pleasure and pain, of hunger, desire, and the like, on precisely the same basis as we attribute these things to the dog."* Like ourselves, this lowly creature makes its way in the world by constant trial and error.

It is interesting to find that so determined an opponent of every form of vitalism as Professor H. F. Osborn recognizes fully this type of individuality and behaviour in creatures of very lowly status. Referring also to the studies of Professor Jennings, he notes how "this author traces the genesis of animal behaviour to reaction and trial. Thus the behaviour of organisms is of such a character as to provide for its own development. Through the principle of the production of varied movements and that of the resolution of one physiological state into another, anything that is possible is tried, and anything that turns out to be advantageous is held and made permanent.

* Quoted by J. A. Thomson, Vol. I, p. 181

Thus the sub-psychic stages when they evolve into the higher stages give us the rudiments of discrimination, of choice, of attention, of desire for food, of sensitiveness to pain, and also give us the foundation of the psychic properties of habit, of memory, and of consciousness."*

Let it be observed that these words refer to creatures very far down in the scale of life. The Amoebae are among the most primitive forms of living creatures. Yet in them we find the rudiments of attention, discrimination, choice ! How astonishing this is perhaps we hardly realize ! Plants of the sorts most familiar to us are far more highly organized than these lowly animal forms; yet they seem to lack these powers of attention, discrimination, choice. They certainly lack those powers of free movement which enable most animals to exhibit their powers of attention and choice. But we must not hastily conclude that therefore they have no powers of self-regulation. It would seem indeed that there is in every organic individual,

* *Origin and Evolution of Life*, p. 113, 114

whether animal or plant, some inner principle of co-ordination and guidance which is essential to its life.

Now, however remote from our conscious experience such inner principle may seem to be, when the whole vast inter-related system of living things is considered, we are compelled to find in our own inner life the surest index to the nature of the animating principle of every individual. We can trace this mingled activity of feeling, thought and will, back from man; discerning its presence, in less developed forms, in the higher animals, whether mammals, birds or insects; detecting indications of it, fainter but as real, in lowlier creatures; and finding its last clear evidence in those microscopic animated jellies which inhabit every pool. Of them, Sir Arthur Shipley writes : " The question of free-will in an Amoeba may still be a subject for argument. Still, there is evidence that a certain amount of discrimination can be exercised even by the lowest, unicellular animals." How far such power is conscious, sub-conscious, or

unconscious, we need not ask. What is certain is that it is the same sort of power as that which emerges into the clear light of consciousness in our own experience.

Against the doctrine of Individuality, which we have reached, a strong objection is made by some thinkers, who urge that the recent study of heredity has disclosed a dependence of the individual on the past which makes all real initiative impossible. It would be quite impossible for me, in the space at my disposal, to deal adequately with the great question which is thus raised. The intricate doctrine of Mendelism would demand long discussion, if examined at all. Let me refer you to Professor J. Arthur Thomson's work on the subject of Heredity. But the Individual in relation to heredity is not to be regarded as the mere resultant of inevitable tendencies and necessary causes. To quote Prof. Thomson, "The gist of the Mendelian discovery is, in Pearl's words, this: 'Hereditary differences behave, in the main, as discrete units, which are shuffled

about and redistributed to individuals in the course of the hereditary process, to a considerable extent independently of each other.'" "The modern study of heredity" Professor Thomson continues, "suggests that our personality is made up of many strands which go back into antiquity and which have a unique combination for each individual. The strands are ancient, but the individual, as Jennings says, 'is a new knot.' . . . There is a fresh unification at the beginning of each individual life—a fresh unification that implies some measure of unpredictability and freedom from the past."*

When we turn back from these investigations to the conclusions which we reached in our discussion of the meaning of Creation as a whole, we find it possible to set forth the following outline: the unity of creation both inorganic and organic, and the order which can be discerned throughout the whole, can only be explained by the activity of a great Universal Intelligence, the nature of which can be more clearly indicated by

* *System of Animate Nature*, Vol. II, Lecture XV.

man's inner conscious life than by any other principle known to us : on the other hand, the same principle furnishes the only clue to the nature of the inner self-regulating activity which, in some form or degree, can be detected in every organic individual.

Having reached this conclusion, we must consider again the question which confronted us when we were considering the relation of the Creative Power to those ultimate values which give meaning to our life. The Beauty of Nature convinced us that in it we truly discern one great purpose in creation. But what of happiness and goodness ? Is the God who made the world so beautiful careless of the happiness of His creatures and regardless of the sin and crime which darken human life ? If not, why is the world so full of evil ?

In dealing with this problem, let us fasten our attention first on the moral side of it. We can then answer the question just stated in this way : God makes the world beautiful because He loves the beautiful and can produce it with-

out the intervention of finite wills. He has not made the world good, because goodness can only come about through the co-operation of finite wills with one another and with Him. Goodness cannot be produced by compulsion. It must be the free offering of the will, recognizing the law of goodness and yielding to it. Goodness throughout the universe is impossible apart from the willing denial of selfish inclination on the part of the individuals who form its social content. It takes man as well as God to make the world good. It may even be said that to make the world as good as it is beautiful would need the willing self-denial and surrender of every personal being in the universe.

Let us now consider what was involved in that moment in creation when the life-series began its wonderful career. Imagine the Creator contemplating the change from the magnificent and beautiful, but lifeless and heartless, inorganic world, to a world of living, growing, and ultimately of feeling, thinking and willing creatures. In the former there can be

no response to His mind and will: only through the creation of a universe of personal beings can He find that response. Assuming that the supreme attribute of God is His Love, we discern at once that He must demand creatures whom He can love and who can love Him in return. But this is also to set free disruptive moral forces which may bring denial and disaster. The power to choose the good involves the power to choose the evil.

How can we represent such a situation to our minds and view it in relation to the actual state of the world but by presuming to think that the Creator took the risk, and launched upon its trial the principle of Individuality? A new form of material medium came into existence, fitted to be the organ of self-directing centres of control—of monads—which thus to some degree incarnated the originating activity of creation. Then began the vast pageant of life. Involving, as it did, the coming into existence, and, from their nature, into competition with one another, of a countless multitude of

Individuals, each self-directed towards the realization of its own potentialities, their common life became inevitably a struggle. Pain, disappointment, pursuit, slaughter, the struggle for existence, the sacrifice of one for the survival of another: all became inevitable. Yet these elements became the means of an upward movement towards higher forms of life and therefore towards fuller realizations of Individuality.

With the emergence of Man, Individuality assumed a depth of meaning and a grasp of external resources before unexampled in the life-series; and, as man came to himself, Individuality was merged in Personality. As a result of this great attainment, while the splendour of Life was enormously augmented, the shadows were as intensely deepened. Pain assumed a terror unknown before; death became a dark mystery; a dim consciousness of another world supervened; love and hate gathered new significances; the tragic side of things, was realized. The socializing of human life enlarged the boundaries of man's interests: the Individual gained a fuller existence

in the Community: he had to learn to live not for himself alone, nor even, like many of the lower animals, for his family; but for a greater whole. Yet this advance, while it brought the knowledge of moral law and the sense of obligation, at the same time set tribe against tribe, or city against city, creating war and wide-spread suffering. Once again, while the splendour grows in brightness, the shadows darken.

Here is the tremendous problem which, if we may venture to express Divine things in our imperfect language, confronted the Creator. The great adventure of the Universe seemed to be doomed to failure, because it involved the bringing into being of the multitude of individuals, each endowed with its share of independent spontaneity; and only by the willing co-operation of all could that supreme and universal harmony, which alone can constitute the true end of Creation, be accomplished.

Let us pause here for a moment in order to observe how the view of the history of the world yielded by science

has enabled us to deal in a much simpler and more intelligible way with the problem of evil than was possible in former times. To the old theologians who started with a clear-cut abstract conception of Divine omnipotence this problem was absolutely insoluble. It was indeed more than an insoluble problem; for many an insoluble problem may be set aside without interfering with the advance of the science to which it is presented. But the problem of evil vitiated more or less all the processes of theological thought. It introduced a preliminary antinomy into every discussion concerning Divine Providence and human destiny. Moreover, the old categories of thought divided the problem of evil into two parts. Physical evil, that is, suffering, seemed to be separable from moral evil, that is, sin. And, what is the relation between suffering and sin? That there is some relation seems clear; yet experience shows that while the innocent very often suffer most terribly, the wicked too often escape.

Now it cannot be pretended that the

scientific view of creation gets rid at one stroke of all these puzzles. But it seems clear that it enables us to shelve them: it shows that we can think out a theological scheme which is founded, not on abstract propositions, but on a great induction. We have no need to define Omnipotence. And, most important of all, perhaps, for our purpose, we can discern, in quite a new way, a relation between physical and moral evil which brings an extraordinary unity into our thought. Both these forms of evil result directly from the gift of Individuality. They are indeed two sides of one fact. It is the essential quality of an individual to be, within certain limits, self-regulating, to have an inner principle of guidance and control. As this inner principle develops in the higher forms of life, it assumes fresh characters: feeling, sensitiveness to pleasure and pain, consciousness, intelligence, will. These endowments are all inter-related. Together, they form the inner quality of the fully developed Individual. It is the possession of feeling and sensitiveness which makes pain pos-

sible; but the more terrible forms of suffering are built upon this foundation by the faculties of thought and will. Moral evil has its root in the will. It springs from the self-assertion of the individual.

Out of the strife of individualities, and of individualities united into communities, has come the vast struggle of the ages. The struggle for existence is the outcome of the creation of Individuality. Whether the individual is alone, or one of a multitude united in some social system, whether he be insect or man, it is the outward push of his inner life, in the effort to realize himself, which creates the conflict. Thence springs the pain of the world, and all its vast sufferings, and, when man appears, those darker evils which arise among beings endowed with a moral nature. Thus it is clear that moral evil supervenes upon physical evil when the higher level is reached; and, though the two may be separable in their incidence, they come from the same source and are organically related. Here is the final justification of the universal belief that

sin and suffering are closely connected, and that evil deeds deserve punishment. It is also true that, in Nature, pain is useful. It is one of the driving forces of progress. The pain of hunger drives the living creature to seek its food. The pain of torn flesh and the fear of such pain impel the hunted animal to seek safety. Through the ministry of pain have come about some of the most perfect and beautiful of living forms. The pursuing wolf-pack gave to the horse his swiftness and his strength. The leopard's claw gave to the antelope its surpassing grace and agility. In human life, the pain of man's pressing needs pushed him ever onward in the path of achievement. With suffering, man is brought into the world; by painful effort on the part of others his early life is nourished and protected: only with painful toil and self-denial can he do his duty as a man: by painful struggle, and generally severe suffering on the part of many, is every onward step in human development attained. Thus the effort of the ndividual towards the realization of self,

and the onward struggle of the race, gain an added force by the impulsion of pain.

Further it is by pain, or the danger of it, that the living creature is normally saved from destruction. An organism insensitive to pain would not long survive, once the power of individual initiative and free movement is gained. Pain sets a limit to adventure in the common experiences of life. If we go wrong we are likely to suffer for it. If we defy the great forces of Nature, they will not spare our feelings. Thus, in the natural course of things, it appears that pain has a saving efficacy. It is a means of deliverance.

From this consideration we can see our way to follow the line of thought which led mankind to connect crime and punishment. Here suffering becomes at once a warning to the sinner, and the due recompense of his sin. The natural experience of mankind is transfigured in the light of moral experience and becomes the source of a moral revelation.

It is one of the greatest glories of Christianity that all these experiences are

further trans-valued into the terms of a still higher experience; and pain becomes the expression of Divine Love and the means of Redemption for man. Here is the significance of the Cross of Christ.

We have dared to think of the Creator taking the tremendous risk of introducing into His universe that principle of Individuality which enables His creatures to choose their own way. Only by that venture could there come into being a rich and varied life reflecting in the infinite variety of its gradations something of the nature of its Author, and rising more and more in its higher stages to knowledge, love, and the greater spiritual attainments. Only thus could there be brought forth, in the final result, children who could freely render to Him their love and service. To this end, He endowed His creatures with the power which made the surrender possible, but which also enabled them to go astray. Considering the tremendous evils which the misuse of this power has brought upon the world, we might be led to fear that the final result can be nothing but confusion and

disaster. When we think of how nearly our boasted civilization was engulfed in the Great War, we might reasonably apprehend that some day the clash of moral and physical forces may utterly destroy all that has been won by the efforts of millenniums, and mankind sink into utter ruin. There is no certainty that what we call progress will continue; or that, if it continues, it will deliver man from the evils which pursue him. Here we pass beyond the limit of scientific thought. And it is just here that our Christian Faith comes in to give us the assurance that we need.

The study of Individuality has presented in a strong light two great contrasting operations of the one principle. On the one hand, the living creature wins its way to a higher life by the exercise of that self-directing power of choice, which may well be described as, in a very limited way, and to a very small degree, an Incarnation of the supreme creative principle. On the other hand, it is this same self-directing power of choice which, when unduly exercised,

becomes aggressive self-assertion, and issues in all the evils which afflict a suffering world. These opposite effects reach their highest point and their greatest effectiveness in the life of man. Here they enter the moral sphere, and acquire a meaning, value, and intensity which belong to this higher level of reality. There emerge all the tremendous duties and sufferings, gains and losses, which belong to beings possessed of spiritual life. Interpreting this situation, we may say that all the gains of the ages were won by Incarnation and all the losses sustained through lack of Atonement. The message of Christianity to the world is that, in Christ, God has completed, and is completing, His great Creative work. In the life, death, and continued work, of Christ, the Divine Love has brought into being the one final and complete Incarnation and has effected the Atonement.

In making this statement I do not mean to affirm that the Atonement has been completed in its application to the world of created beings. We have only to

look about us upon the state of human things as they are to-day to realize how far off is the ultimate reconciliation. The message of Christianity to the world is that, in Christ, God has entered the life of His creatures as the Reconciler; and that, by the operation of the spiritual forces which proceed from Him, He will overcome all oppositions. Incarnation and Atonement taken together as two aspects of the one supreme truth are the expression of the Divine Love : they are Divine Love in action.

There are many moral forces and influences which have the effect of overcoming the antagonisms of contending wills : Reason can persuade the intellect, the appeal to interest will often make men sink their differences, the bonds created by a common social life keep them from pushing oppositions and competitions to an extremity. All these work for good against the disruptive force of self-asserting will. But far above them, both in its quality and in its range, is the reconciling power of Love. Other influences lead to accommodations and

compromises. Love conquers without destroying, and in conquering fulfils. Love is the giving of self—self finding itself in the other. Love makes complete sacrifice, and thus annihilates the opposition between self and self.

If Love thus conceived be indeed the character of God, we must discern in Him the one power which can overcome the warring elements in creation and produce that final harmony and blessedness which we call the Kingdom of God; nor can we think it alien to His nature that, in the very focus of the history of this world, He should by means of a supreme Incarnation complete the vast process of the ages and set free spiritual forces by which He will ultimately overcome all oppositions. The Love of God, sovereign and all-embracing, will surely conquer all resisting forces, and perfect the work of Creation. And He has all eternity before Him, for it is surely clear that the conception of God's relation to His universe which thus emerges, demands another world, and a higher life, for the fulfilment of His purpose.

In the Epistle to the Hebrews there is a great assertion which, I think, acquires a new significance if there is anything of truth in the conceptions to which we have been led. "It became Him, for whom are all things and through whom are all things, in bringing many sons unto glory to make the author of their salvation perfect through sufferings." It is here affirmed that the sufferings of Christ are in accordance with the greatness of the Creator. It was becoming, says the writer of the Epistle, that the Supreme Power of the universe should win His way to victory through suffering; or, in other words, the sufferings of Christ are in accordance with the greatness of God. At first sight this is a mere paradox. But when we think of the Creator as the author of a universe which is a vast adventure, in which success depends upon the victory of love over the wayward impulses of the multitude of finite wills, Atonement through Incarnation, involving complete participation in the pain of all suffering creatures, is the only way, worthy by its moral splendour, of the

supreme glory of God. God, according to this view, is the greatest of moral heroes.

My aim throughout these lectures has been to bring into clear light the reasons for the profound conviction which possesses me that the modern scientific way of viewing the history of the world, instead of creating difficulties for Christian thought, not only gets rid of problems which were found insoluble by the theologians of the past, but affords fresh reason for the essential doctrines of the Christian Faith. Above all, it seems to me that the fundamental conceptions of Christianity—God as at once sole Creator and Eternal Love, Incarnation and Atonement—are consonant with the underlying principles involved in the scientific revelation of the creative process.

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